Alapati, Nanda

From: Alapati, Nanda
Sent: Saturday, November 01, 2008 3:42 PM
To: Matthew Merkling
Subject: 10/659,725; draft response, for 04-Nov-2008 interview @ 2:00 pm

Via Facsimile to: 571-273-9813 (16 pages total, including this page)

Date: 01-Nov-2008
To: Matt MERKLING, GAU 1764 (571-272-9813)
From: Nanda Alapati (703-394-2216)
Subject: 10/659,725, draft response, in advance of interview

Dear Mr. Merkling:

Attached is a DRAFT amendment (for discussion only) in response to the 10-Jun-2008 final office action.

This draft amendment is being sent in advance of our interview at 2:00 pm on Nov 4 to discuss the office action and the prior art.

I will telephone you at 2:00 pm on November 4.

Thank you and best regards,

Nanda Alapati
Womble Carlyle Sandridge & Rice PLLC
8065 Leesburg Pike -- 4th Floor
Tysons Corner, VA 22182
703-394-2216 (v)
703-790-2623 (f)
Nalapati@wcsr.com

IN THE U.S. PATENT AND TRADEMARK OFFICE

Application No.: 10/659,725	**Confirmation No.** 3878
Application of: M. Mansour et al	**Group Art Unit:** 1764
Filing Date: Sept 10, 2003	**Examiner: MERKLING, Matthew J.**
Title: Steam Reforming Process and Apparatus	**New Docket No.** T127 1010.1 **Customer No.** 26158

AMENDMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the 10 June 2008 office action, please enter and consider the following amendment and remarks.

Amendments to the specification begin on page 2 of this paper.

Amendments to the claims begin on page 3 of this paper.

Remarks begin on page 11 of this paper.

IN THE SPECIFICATION

Please amend the following paragraphs in the manner indicated

Please the amend the paragraph at page 24, line 24 – page 25, line 11[1] as follows

In the embodiment illustrated in FIG. 5, the carbon trim cell 40 is shown separate from the thermochemical apparatus 10. In other embodiments, however, the carbon trim cell 40 may be internal to the apparatus 10. For example, referring to FIG. 6, an alternative embodiment of a steam reforming system containing a carbon trim cell 40 is shown. In this embodiment, the fluidized bed drain nozzle 40, which is located below the fluidized bed 14, may itself be converted into a fluidized bed or fixed bed carbon trim cell. For example, the bed drain nozzle of the fluidized bed 14 may be made tapered and having a length to accommodate greater amounts of material. In one embodiment, for instance, as shown in FIG. 6, the bed drain nozzle may have a shape that is similar to an inverted frustum of a cone with a shallow angle to the vertical. A gaseous medium comprising a mixture of steam and an oxygen containing gas may be fed to the bed drain nozzle 40 causing carbon oxidation and steam reforming to occur before the bed material is extracted from the bottom of the fluidized bed 14. More particularly, the gaseous medium is fed through the bed drain nozzle 40 and into the bottom portion of the fluidized bed 14 where it gasifies carbon particles. Due to carbon oxidation, the temperature of the bed drain nozzle 40 may increase to greater than about 1200 degrees F., such as when processing spent black liquor. More particularly, the temperature of the bed drain nozzle 40 may increase to from about 1200 degrees F. to about 1275 degrees F. while the temperature of the fluidized bed 14 is maintained below 1200 degrees F. In general, the bed drain nozzle 40 as shown in FIG. 6 may operate according to the same parameters discussed above with respect to the fluidized bed 40 as shown in FIG. 5.

[1] This is paragraph [0110] in Published U.S. Patent Application 2004/0182000A1, published Sept 23, 2004.

IN THE CLAIMS

The following will replace all prior versions, and listings, of the claims in this application.

1-18. (Canceled)

19. (Currently Amended) A process for producing a product gas having heat or fuel value comprising:

feeding a carbonaceous material to a first fluidized bed, ~~wherein~~ the first fluidized bed containing particles suspended in a fluid medium;

indirectly heating the first fluidized bed with a pulse combustion device, at least a portion of the carbonaceous material being gasified to form a first product gas stream;

extracting bed solids containing carbon from the first fluidized bed and feeding the extracted solids to a second fluidized bed separate from the first fluidized bed, the second fluidized bed being at a temperature higher than the temperature of the first fluidized bed, the second fluidized bed having a fluidizing medium comprising steam and an oxygen-containing gas, wherein:

a first portion of the extracted bed solids is oxidized in the second fluidized bed and a second portion of the extracted bed solids is endothermically converted to a gas in the second fluidized bed, to thereby form a second product gas stream; and

the second fluidized bed is heated by oxidizing carbon in the bed, and without an external heat source.

20. (Original) A process as defined in claim 19, wherein the first fluidized bed is maintained at a temperature of less than about 1150 degrees F.

21. (Original) A process as defined in claim 19, wherein the carbonaceous material comprises black liquor.

22. (Previously Presented) A process as defined in claim 19, wherein the first product gas stream is fed to a filtering device for filtering solids entrained in the first product gas stream, the filtered solids being recirculated back to the first fluidized bed.

23. (Original) A process as defined in claim 19, wherein the fluidizing medium fed to the second bed contains oxygen in a stoichiometric amount of less than about 50% based on the amount of carbon in the bed.

24. (Canceled)

25. (Original) A process as defined in claim 19, wherein the portion of the carbonaceous material gasified in the first fluidized bed is endothermically converted to a gas.

26. (Original) A process as defined in claim 19, wherein the fluidized bed particles contained in the first fluidized bed and the second fluidized bed comprise sodium carbonate.

27. (Canceled)

28. (Original) A process as defined in claim 19, wherein the second product gas stream is filtered in order to remove entrained solids.

29. (Previously Presented) A process as defined in claim 28, wherein the entrained solids removed from the second product gas stream are recirculated.

30. (Previously Presented) A process as defined in claim 29, wherein the entrained solids removed from the second product gas stream are introduced into the second fluidized bed.

31. (Original) A process as defined in claim 19, wherein the first product gas stream is combined with the second product gas stream.

32. (Canceled)

33. (Currently Amended) A process for producing a product gas having heat or fuel value comprising:

feeding a carbonaceous material to a fluidized bed, the fluidized bed containing particles suspended in a fluid medium, the fluidized bed including a top portion and a bottom portion, the bottom portion being in communication with a solids collection reservoir located below the bottom portion;

indirectly heating the fluidized bed with a pulse combustion device, a portion of the carbonaceous material fed to the fluidized bed being gasified to form a product gas stream; and

feeding a gaseous medium through the solids collection reservoir and into the bottom portion of the fluidized bed where the gaseous medium gasifies carbon particles, the gaseous medium comprising an oxygen-containing gas, ~~the gaseous medium gasifying carbon particles that have accumulated in the bottom portion of the fluidized bed,~~ wherein:

a first portion of the carbon particles contained in the solids collection reservoir is oxidized and a second portion of the carbon particles contained in the solids collection reservoir is endothermically converted to a gas.

34. (Original) A process as defined in claim 33, wherein the fluid medium in the fluidized bed comprises steam.

35. (Original) A process as defined in claim 33, wherein the fluidized bed is heated to a temperature of less than about 1150 degrees F.

36. (Original) A process as defined in claim 33, wherein the fluidized bed is heated to a temperature of less than about 1100 degrees F.

37. (Original) A process as defined in claim 33, wherein the product gas stream is fed to a filtering device for filtering solids entrained in the product gas stream, the filtered solids being recirculated back to the fluidized bed.

38. (Original) A process as defined in claim 33, wherein the gaseous medium fed through the solids collection reservoir contains oxygen in a stoichiometric amount less than about 50%.

39. (Canceled)

40. (Original) A process as defined in claim 33, wherein the solids collection reservoir is maintained at a higher temperature than the fluidized bed.

41. (Original) A process as defined in claim 33, wherein the carbonaceous material comprises a black liquor.

42. (Original) A process as defined in claim 34, wherein at least a portion of the carbonaceous material fed to the fluidized bed is steam reformed to form the product gas stream.

43. (Original) A process as defined in claim 41, wherein the particles suspended in the fluidized bed comprise sodium carbonate.

44. (Canceled)

45. (Original) A process as defined in claim 33, wherein the particles suspended in the fluidized bed comprise sodium carbonate and the fluidizing medium comprises steam, the carbonaceous material being fed to the fluidized bed comprising black liquor, a majority of the black liquor being steam reformed in the fluidized bed, and wherein a portion of the carbon particles that have accumulated in the bottom portion of the fluidized bed are oxidized, while another portion of the carbon particles are steam reformed.

46-93. (Canceled)

94. (Currently Amended) A process for producing a product gas having heat or fuel value comprising:

feeding a carbonaceous material to a fluidized bed, the fluidized bed containing particles suspended in a fluid medium, the fluidized bed including a top portion and a bottom portion, the bottom portion being in communication with a solids collection reservoir located below the bottom portion;

indirectly heating the fluidized bed with a pulse combustion device, a portion of the carbonaceous material fed to the fluidized bed being gasified to form a product gas stream; and

feeding a gaseous medium through the solids collection reservoir and into the bottom portion of the fluidized bed where the gaseous medium gasifies carbon particles, the gaseous medium comprising an oxygen-containing gas, ~~the gaseous medium gasifying carbon particles that have accumulated in the bottom portion of the fluidized bed,~~ wherein:

the solids collection reservoir is maintained at a higher temperature than the fluidized bed.

95. (Previously Presented) A process as defined in claim 94, wherein the fluid medium in the fluidized bed comprises steam.

96. (Previously Presented) A process as defined in claim 95, wherein at least a portion of the carbonaceous material fed to the fluidized bed is steam reformed to form the product gas stream.

97. (Previously Presented) A process as defined in claim 94, wherein the fluidized bed is heated to a temperature of less than about 1150 degrees F.

98. (Previously Presented) A process as defined in claim 94, wherein the fluidized bed is heated to a temperature of less than about 1100 degrees F.

99. (Previously Presented) A process as defined in claim 94, wherein the product gas stream is fed to a filtering device for filtering solids entrained in the product gas stream, the filtered

solids being recirculated back to the fluidized bed.

100. (Previously Presented) A process as defined in claim 94, wherein the gaseous medium fed through the solids collection reservoir contains oxygen in a stoichiometric amount less than about 50%.

101. (Previously Presented) A process as defined in claim 94, wherein a portion of the carbon particles contained in the solids collection reservoir are oxidized and wherein another portion of the carbon particles contained within the solids collection reservoir are endothermically converted to a gas.

102. (Previously Presented) A process as defined in claim 94, wherein the carbonaceous material comprises a black liquor.

103. (Previously Presented) A process as defined in claim 102, wherein the particles suspended in the fluidized bed comprise sodium carbonate.

104. (Canceled)

105. (Previously Presented) A process as defined in claim 94, wherein the particles suspended in the fluidized bed comprise sodium carbonate and the fluidizing medium comprises steam, the carbonaceous material being fed to the fluidized bed comprising black liquor, a majority of the black liquor being steam reformed in the fluidized bed, and wherein a portion of the carbon particles that have accumulated in the bottom portion of the fluidized bed are oxidized, while another portion of the carbon particles are steam reformed.

106. (Currently Amended) A process for producing a product gas having heat or fuel value comprising:

feeding a carbonaceous material to a fluidized bed, the fluidized bed containing particles suspended in a fluid medium, the fluidized bed including a top portion and a bottom portion, the

bottom portion being in communication with a solids collection reservoir located below the bottom portion; ~~and~~

indirectly heating the fluidized bed with a pulse combustion device, a portion of the carbonaceous material fed to the fluidized bed being gasified to form a product gas stream; and

feeding a gaseous medium through the solids collection reservoir and into the bottom portion of the fluidized bed, wherein:

the particles suspended in the fluidized bed comprise sodium carbonate;

the fluid medium comprises steam and an oxygen-containing gas;

the carbonaceous material being fed to the fluidized bed comprises black liquor, a majority of the black liquor being steam reformed in the fluidized bed, and

a first portion of the carbon particles that have accumulated in the bottom portion of the fluidized bed are oxidized, and a second portion of the carbon particles are steam reformed.

107. (Previously Presented) A process as defined in claim 106, wherein the fluidized bed is heated to a temperature of less than about 1150 degrees F.

108. (Previously Presented) A process as defined in claim 106, wherein the fluidized bed is heated to a temperature of less than about 1100 degrees F.

109. (Previously Presented) A process as defined in claim 106, wherein the product gas stream is fed to a filtering device for filtering solids entrained in the product gas stream, the filtered solids being recirculated back to the fluidized bed.

110. (Previously Presented) A process as defined in claim 106, wherein the gaseous medium fed through the solids collection reservoir contains oxygen in a stoichiometric amount less than about 50%.

111. (Previously Presented) A process as defined in claim 106, wherein a portion of the carbon particles contained in the solids collection reservoir are oxidized and wherein another portion of

the carbon particles contained within the solids collection reservoir are endothermically converted to a gas.

112. (Previously Presented) A process as defined in claim 106, wherein the solids collection reservoir is maintained at a higher temperature than the fluidized bed.

113. (Canceled)

114. (Previously Presented) A process as defined in claim 19, wherein the extracted solids and oxygen-containing gas are separately introduced to the second fluidized bed.

REMARKS

The undersigned attorney for applicant thanks Examiner Merkling for the telephone interview held on November ___, 2008, during which the amendments and arguments presented herein were discussed. During the interview, the Examiner agreed that the present amendment overcomes the cited combination of references. It is understood, however, that the Examiner reserves the right to conduct a supplemental search.

In the 10 June 2008 office action, all pending claims were rejected as being unpatentable over the prior art under 35 USC 103(a).

In paragraph 2, Claims 19, 20, 33 and 94 were rejected under 35 USC 103(a) as being anticipated by USP 2,680,065 to Atwell in view of USP 5,306,481 to Mansour.

In paragraph 3, Claims 19-22, 25, 26, 28-31, 33-37, 40-43, 45, 94-99, 101-103, 105-109, 111 and 112 were rejected under 35 USC 103(a) as being unpatentable over USP 5,752,994 to Monacelli in view of Mansour and USP 4,097,361 to Ashworth.

In paragraph 4 of the office action, Claims 19-22, 25, 27-31, 33-37, 40-42, 94-99,101, 102 and 104 were rejected under 35 USC 103(b) as being unpatentable over Ashworth in view of Mansour.

In paragraph 5 of the office action, Claims 23, 38, 100 and 110 were rejected under 35 USC 103(a) as being unpatentable over Monacelli, Mansour and Ashworth as applied to claims 19, 33, 34 and 96, and further in view of USP 5,624,470 to Tanca

In paragraph 6 of the office action, Claims 23, 38 and 100 were rejected under 35 USC 103(a) as being unpatentable over Ashworth and Mansour as applied to claims 19, 33 and 94, and further in view of Tanca.

Claims 19-23, 25-26, 28-31, 33-38, 40-43, 45, 94-103, 105-112 and 114, as amended, are pending.

Amendments to the Specification

The specification has been amended at paragraph [0110] to describe the location of the bed drain nozzle relative to the fluidized bed 14, as seen in Fig. 6. This paragraph has further been amended to describe the action of the gaseous medium that passes through the bed drain nozzle. Support for the added language in the paragraph comes, in part, from original claim 33 which read the step of "feeding a gaseous medium through the solids collection reservoir, the gaseous medium comprising an oxygen-containing gas, the gaseous medium gasifying carbon particles that have accumulated in the bottom portion of the fluidized bed."

It is believed that no new matter has been introduced into the application by the present changes to the specification.

Amendments to the Claims

Independent claim 19 has been amended to include the limitations of now-canceled claim 27.

Independent claims 33, 94 and 106 have been amended to recite that:

(1) the solids collection reservoir[2] is located below the bottom portion of the fluidized bed, and

(2) gaseous medium is fed through the solids collection reservoir and into the bottom portion of the fluidized bed.

In claims 33 and 94, it is specifically stated that the gaseous medium gasifies carbon particles in the bottom portion of the fluidized bed. It is believed that no new matter has been introduced into the application by the present changes to the claims.

Patentability of pending independent claim 19

Pending claim 19 now includes the limitations of canceled claim 27. In the June 10, 2008 final office action, claim 27 was rejected as being obvious over Ashworth in view of Mansour.

[2] In paragraph [0014] of the present published application 2004/0182000, it is explained that one embodiment of the "solids collection reservoir" is a 'bed drain nozzle'.

In formulating the rejection of claim 19 over this combination of references, the Examiner first conceded that:

> [t]he method of Ashworth teaches utilizing heat from the partial combustion of char in second fluidized bed (40) as the sole source of heat required for the first fluidized bed (30, see abstract). As such, Ashworth does not teach a pulse combustion device which heats the first fluidized bed where an endothermic reaction takes place."

The Examiner then went on to assert that:

> [a]dding the pulse combustor of Mansour to the first fluidized bed of Ashworth would have been obvious . . as a means to supplement the sole heat source for the endothermic reaction which takes place in the first fluidized bed with a highly efficient means to add heat . . Furthermore, such modification would amount to nothing more than applying a known technique to a known device to yield predictable results."

It is submitted that, contrary to the Examiner's assertion, one skilled in the art would not be likely to modify Ashworth's first fluid bed reactor by adding pulse heaters. This is because Ashworth teaches away adding external heat source to the first fluidized bed. In particular, as stated at col. 6, lines 33-41 of Ashworth:

> The pyrolysis unit 30 employs a fluidized bed of hot ash and char. Preheated steam from conduit 31 is injected upwardly into the fluid bed as the fluidizing medium, whereby hydrogen required for the hydrogenation and hydrocracking reactions is produced by way of the steam-carbon and water-gas-shift reactions. No air or oxygen is required, and direct heating is not necessary because the heat requirements are supplied by hot recycled ash from the char gasification unit 40. at col.

In other words, due to heat created by "hot recycled ash" from the second fluidized bed, one skilled in art would understand that Ashworth obviates the need to have separate heating of the first fluidized bed. It is therefore submitted that one skilled in the art would not be inclined to indirectly heat the first fluidized bed with a pulse combustion device, as called for in pending claim 19.

It is additionally submitted that the Examiner's observation that such a modification is simply "applying a known technique to a known device to yield predictable results" is entirely

inapplicable in this instance, where the reference disclosing the "known device" actually teaches away from the suggested modification.

In view of the foregoing, pending claim 19, and all claims depending thereon, are believed to define over the Ashworth in view of Mansour.

Patentability of pending independent claims 33, 94 and 106

It is submitted that pending independent claims 33, 94 and 106 define over the cited combination of references. Claims 33, 94 and 106 now recite that:

(1) the solids collection reservoir is located below the bottom portion of the fluidized bed; and

(2) the gaseous medium is fed through the solids collection reservoir and into the bottom portion of the fluidized bed.

It is submitted that no combination of the prior art teaches this combination of features, and so independent claims 33, 94 and 106, and all claims depending thereon, should be allowed.

In addition, claim 33 and 94 further specify that the gaseous medium gasifies carbon particles in the bottom portion of the fluidize bed. For this separate reason, claims 33 and 94, and all claims depending thereon, should also be allowed.

With respect to all claims not specifically mentioned, it is submitted that these are patentable not only by virtue of their dependency on their respective base claims and any intervening claims, but also for the totality of features recited therein.

Reconsideration of the application is requested. All pending claims are believed to be allowable over the prior art of record. An early notice of allowance is solicited so that the application may proceed to issue.

No fee is believed to be due for the claim changes of the present amendment. Should a fee be required, the Director is authorized to charge any such fee to Womble Carlyle's Deposit Account No. 09-0528 (T127 1010.1).

Respectfully Submitted,

Date: November 6, 2008

/Nanda K. Alapati/
Nanda K. Alapati (Reg. No. 39,893)
703-394-2216
USPTO Customer No. 26158